Atlantic Upper Jurassic Clastic (AUJ C1) Play

***Pseudocyclammina jaccardi* through *Ctenidodinium penneum* biozones**

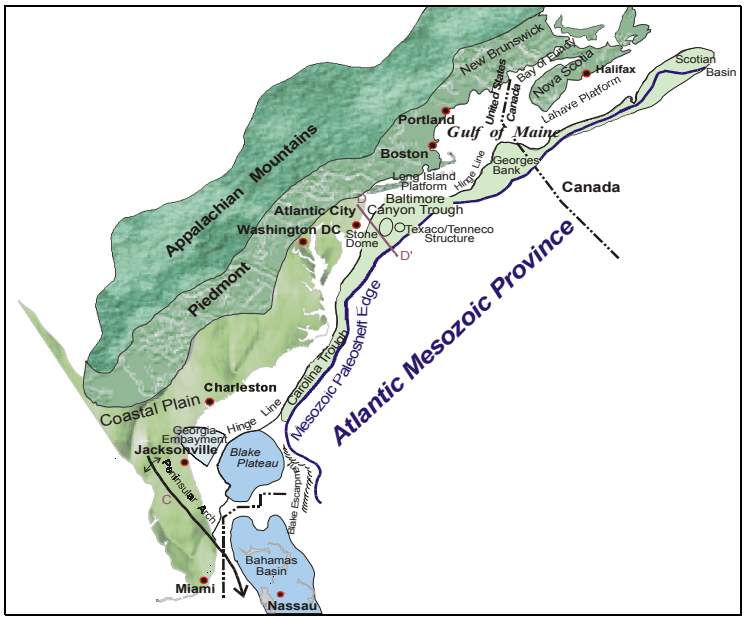


Figure 1. Physiographic map of the Atlantic Margin.

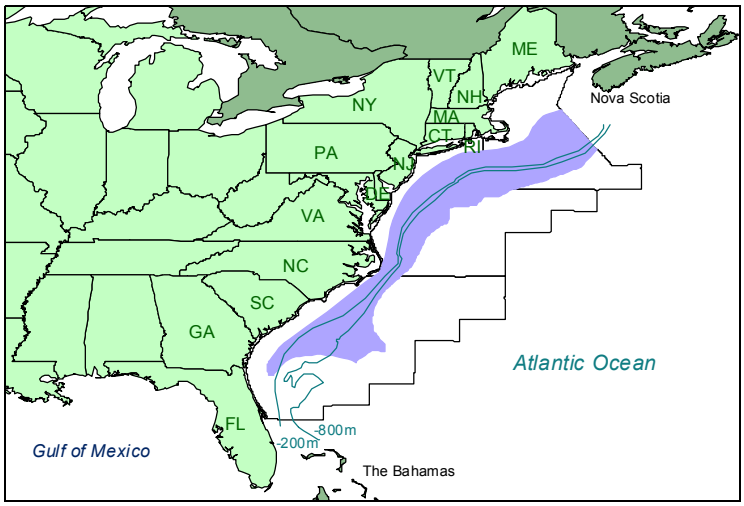


Figure 2. Play location.

Play Description

The frontier Atlantic Upper Jurassic Clastic (AUJ C1) play occurs within the *Pseudocyclammina jaccardi*, *Senoniasphaera jurassica*, *Epistomina uhligi*, and *Ctenidodinium penneum* biozones. This play extends from the U.S.-Canadian border through the Carolina Trough to the Blake Plateau (figures 1 and 2).

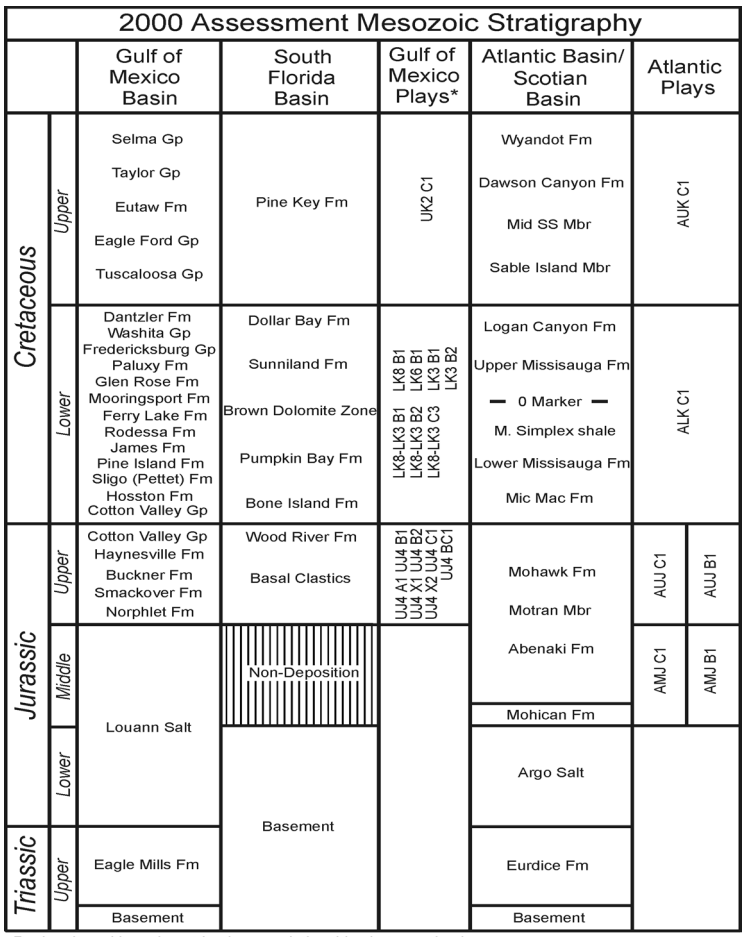
The updip assessment limit is the shoreward erosional limit of upper Jurassic sediments. Downdip, upper Jurassic sediments exhibit a facies change from nearshore clastic sediments to the platform carbonates and shelf-edge reef of the Atlantic Upper Jurassic Carbonate (AUJ B1) play. Where clastic sediment influx was great enough, deltas prograded across AUJ B1 carbonates, depositing fans on the slope. These slope fans define the downdip limit of the AUJ C1 play.

The AUJ C1 play is stratigraphically and structurally similar to the Atlantic Lower Cretaceous Clastic (ALK C1) and Atlantic Middle Jurassic Clastic (AMJ C1) plays.

Play Characteristics

During the upper Jurassic, clastic sediments were eroded from the Appalachian Mountains and were deposited on the Atlantic Margin shelf. Delta complexes prograded across the shelf and, where clastic sediment influx was great enough, fans were deposited on the slope. Potential upper Jurassic reservoirs were deposited in delta complexes, barrier bars, and channel systems on the shelf, and in fan complexes on the slope.

Potential trapping structures on the shelf include normal faults, growth faults, and anticlines. Potential trapping features on the slope include anticlines and sediment pinch-outs against diapirs. Potential source rocks are Jurassic shelf and



Rock unit positions do not imply age relationships between basins.
* Does not include plays that span ages.

Figure 3. Mesozoic stratigraphy of the Gulf of Mexico and Atlantic Margins.

AUJ C1 Play Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	0	0.000	0.000	0.000
Cumulative production	–	0.000	0.000	0.000
Remaining proved	–	0.000	0.000	0.000
Unproved	0	0.000	0.000	0.000
Appreciation (P & U)	–	0.000	0.000	0.000
Undiscovered Conventionally Recoverable Resources				
95th percentile	–	0.545	6.401	1.832
Mean	200	0.822	8.953	2.415
5th percentile	–	1.153	13.270	3.273
Total Endowment				
95th percentile	–	0.545	6.401	1.832
Mean	200	0.822	8.953	2.415
5th percentile	–	1.153	13.270	3.273

Table 1. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

slope shales, though Jurassic lagoonal and platform carbonates may also provide potential source rocks. Geochemical analysis indicates organic matter to be primarily Type III with total organic carbon (TOC) ranging from 0.5 to 3 percent. The hydrocarbon evolution window extends from approximately 7,000 to 18,000 feet. Seals are provided by upper Jurassic or lowermost Cretaceous limestones or overlying shales.

Discoveries

Exploration in the Atlantic Federal OCS area consists of 46 exploration and 5 COST wells, of which 41 penetrated confirmed or probable upper Jurassic clastic sediments. Five of the eight wells in the relinquished Hudson Canyon 598 field encountered hydrocarbons (95 MMcfd total) from upper Jurassic clastic intervals.

Analogs

Because the AUJ C1 play contains no active Federal fields, productive upper Jurassic clastic sediments from both the onshore eastern Gulf of Mexico and the Canadian offshore Scotian Basin provide the analogs for input parameters used in this assessment.

The onshore Gulf of Mexico upper Jurassic clastic analog comprises the Smackover Formation and Cotton Valley Group of Mississippi and Alabama (figure 3). The analog type field for the AUJ C1 play is the Thomasville Field, Rankin County, Mississippi. Production is from an upper Jurassic clastic section within the Smackover Formation (figure 3).

The Gulf of Mexico analog area covers 6.2 million acres (9,750 square miles). Exploration in the analog has a success rate of approximately 10 percent, and drilling is at a mature stage with approximately 60 to 90 percent of the area explored. Fields in the analog area contain an average of 40 percent oil, 29 percent gas, and 31 percent mixed hydrocar-

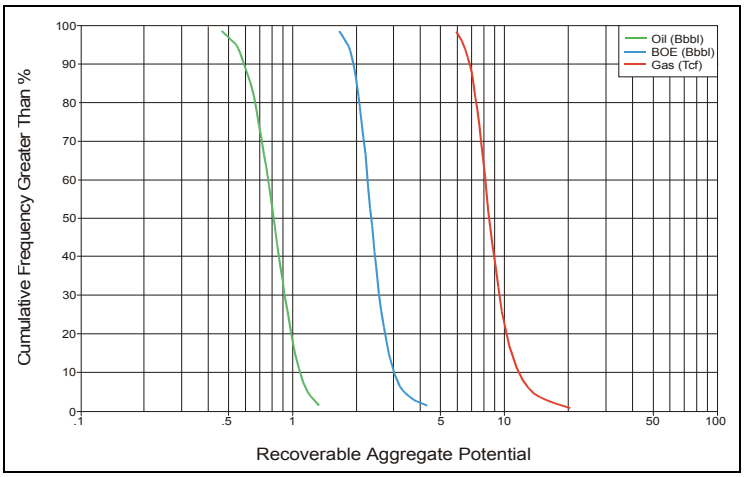


Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

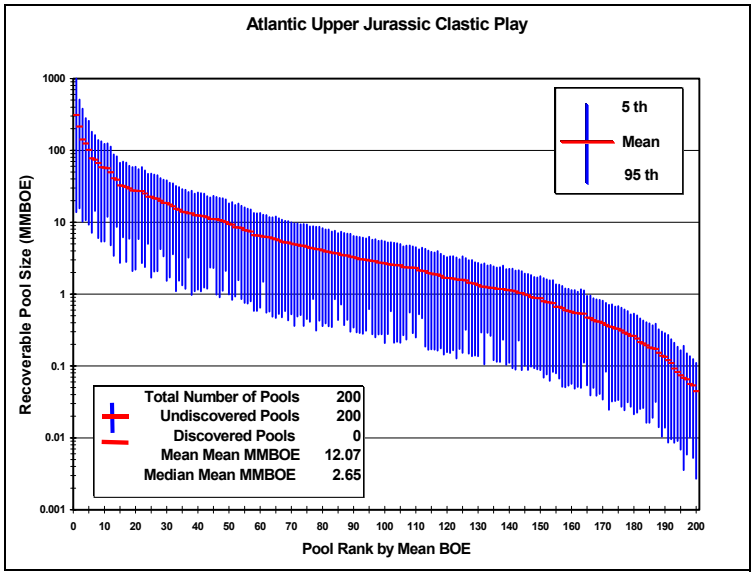


Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).

bons. Fields producing from the well-established Norphlet trend were not used as analogs in this assessment because they produce from eolian sands that are not comparable to the deltaic and fan deposits in the AUJ C1 play.

The Scotian Basin (figure 1) upper Jurassic clastic analog comprises the Mic Mac Formation (figure 3) and covers an area of 35 million acres (54,700 square miles). Exploration in this analog area has a success rate of approximately 30 percent, and drilling is at an immature stage with only about 30 percent of the analog area being explored. This analog was used primarily for field size distribution parameters because production data are not available.

Assessment Results

The marginal probability of hydrocarbons for the AUJ C1 play is 1.00. Assessment results indicate that undiscovered conventionally recoverable resources (UCRR) have a range of 0.545 to 1.153 Bbo and 6.401 to 13.270 Tcfg at the 95th and 5th percentiles, respectively (table 1; figure 4). Mean UCRR are forecast at 0.822 Bbo and 8.953 Tcfg (2.415 BBOE). These undiscovered resources might occur in as many as 200 pools. These pools have a mean size range of <1 to 310 MMBOE (figure 5) and a mean mean size of 12 MMBOE.

Of the 11 Atlantic plays, the AUJ C1 play is projected to contain the largest amount of undiscovered oil resources (36%) and the second largest amount of undiscovered gas resources (33%). Potential for discoveries extends from the U.S.-Canadian border through the Carolina Trough to the Blake Plateau (figure 2).